3.0 Providing Public Access to Environmental Data

The goal of EMPACT is to make time-relevant environmental information and data accessible to individuals so that they can make informed decisions about their day-to-day lives. The World Wide Web is one of the best ways of providing this information to the public, and every EMPACT project is required to maintain a Web site. Many people, however, especially those who live in disadvantaged communities that may benefit most from EMPACT, do not have access to the Web. It is therefore imperative that each EMPACT project use other tools besides the World Wide Web to provide environmental information to the public. In addition, EMPACT Web sites will be of little use if people do not know about them. As such, projects should also consider ways to publicize their efforts, through, for example, newspapers, electronic media, community meetings.

Another goal of EMPACT is to make raw unprocessed data available to secondary users for their own purposes. EMPACT projects are therefore strongly encouraged to create open access systems that will allow users to access raw data. Requirements for open access systems are addressed in section 1.4.2.

There are two caveats that must be considered in providing time-relevant data, whether on the Web or through other means.

First, time-relevant data is provisional by nature. Raw data that is collected and updated at intervals measured in seconds, minutes, or even hours is often difficult to screen thoroughly and quality test before being provided to the public. Rigorous quality control measures can delay the release of data, which potentially undermines the goal of providing data in close to real time. EMPACT projects should warn users that the data is provisional and may contain errors or anomalies. Management procedures should be also established to address data values that are anomalous or erroneous.

Second, data should be presented so that it can be understood by the general public. Data alone has little value. It must be presented in a context and qualified so users understand the significance of data values. From this perspective, most EMPACT projects involve risk communications. One aspect of risk communication is that information should be presented in a way that allows users to apply it accurately and effectively in weighing environmental risks. simple, yet responsible explanations that address the relative risks of exposure to environmental contaminants are essential in preventing misinterpretation or unnecessary public alarm.

3.1 Delivering Data and Information Via the World Wide Web

The World Wide Web has made it possible for EMPACT and the concept of time-relevant data delivery to be a reality. The Web offers a powerful and unprecedented tool for making data available to the public in near real time. One of the advantages of the Web is that it allows data to be displayed in a variety of ways, depending on the type of data and the preferences of the user. This section highlights different ways of displaying data on the Web and provides guidance to EMPACT projects on the design of their Web sites.

3.1.1 Web Site Guidelines

Each EMPACT project is required to provide a World Wide Web home page that describes its project and posts local environmental data. Projects should follow generally accepted practices and standards when constructing their Web sites. These include:

- maintaining a common look and feel throughout the site;
- ensuring that pages download within an acceptable amount of time for slower Internet connections; and
- testing the Web site on different Web browsers, particularly Netscape Navigator and Microsoft Internet Explorer, and on different browser versions.

In addition to following good Web design practices, EMPACT projects are expected to adhere to the following guidelines:

1. Produce separate pages for each city where a project is active.
2. Include the name "EMPACT...." in the Web page title and header.
3. Link to the EMPACT home page and the home pages of any partners using their logos or symbols.
4. Provide access to the real time data or its representations (graphs, charts, maps, animations).
5. Provide a summary of the project, its intended audience, and the methodologies being used.
6. Indicate how often the site is updated and when it was last updated.
7. Maintain the page in a timely and reasonable fashion.
8. Provide contacts for questions about the local project (e-mail, phone, mailing address).
9. Provide contextual information for the data and/or message to be understood by the intended audience.

10. Label monitoring sites on maps (in as clear and geographically recognizable locations as possible).
11. Link to other projects located within the same metro area, if appropriate.
12. Describe the provisional nature of the information and any applicable disclaimer indicating sources for "official" data.
12. Provide a link to any metadata for the project and its data sets.
14. Explain how secondary users can obtain access to the data.

These guidelines are intended to ensure that project environmental information and data is easily accessible, well-documented, responsible, and linked to EMPACT.

3.1.2 Ways of Displaying Data

Tables

Tables are a simple way of displaying multiple data values, such as those recorded by an environmental monitoring station. Tabular data used in EMPACT projects should be carefully formatted, however, since columns of numbers alone can be difficult to interpret. The National Weather Service's Internet Weather Source (IWS) shown in Figure 3-1 is a good example of how tabular data can be clearly presented.

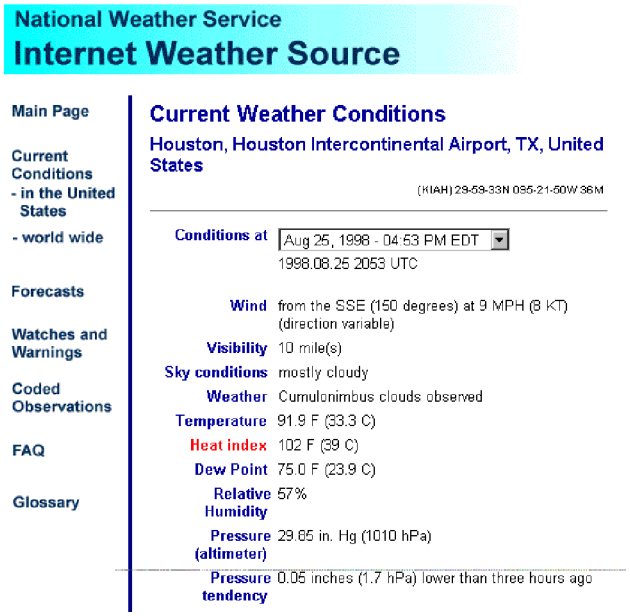


FIGURE 3-1: Weather Conditions from Houston International Airport via Internet Weather Service *http://tgsv7.nws.noaa.gov/weather/current/KIAH.html*

Maps

Maps show the locational aspects of a body of data, usually in terms of spatial or geographic coordinates (e.g., latitudes and longitudes). Many EMPACT projects feature data that can be displayed on maps.

Web-based maps can be created as static images or generated dynamically. Dynamic maps are produced "on-the-fly" with a geographic information system or GIS that allows users to customize how data is mapped. GIS refers to an automated system for capturing, storing, retrieving, analyzing, and displaying spatial data. Figures 3-2 is an example of a GIS map generated for the AIRNOW project.

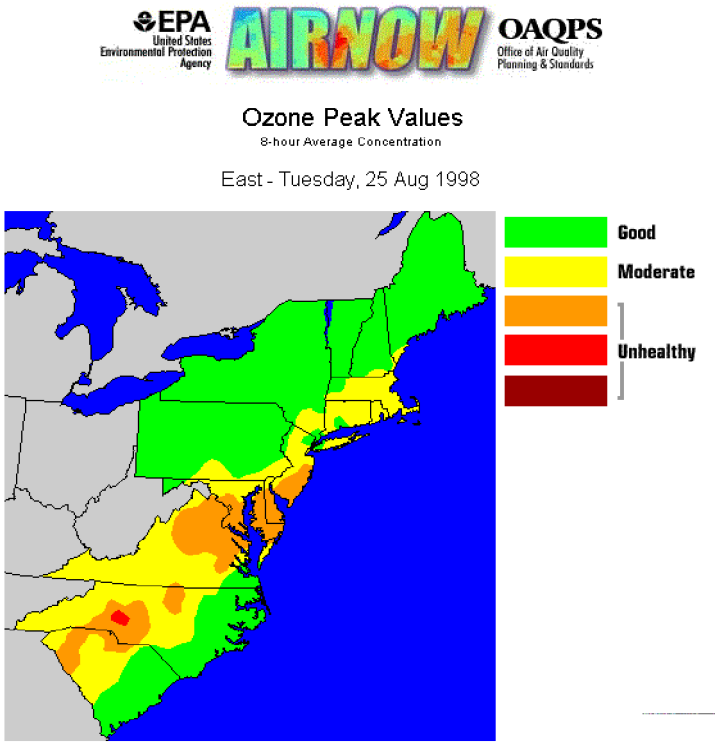


FIGURE 3-2: AIRNOW Map Showing Near Real-Time Ozone Peak Values in Eastern U.S. *http://www.epa.gov/airnow*

Graphs

Graphs and charts are typically used to display one or more sets of data points plotted against time. Like maps, Web-based graphs can be created as static or dynamic images. Dynamic graphs are usually generated through a common gateway interface (GCI) or through an Active Server Page (ASP). GCI and ASP allow users to process data on an program which is ASP scripts are processed on a Microsoft Web server. Figures 3-3 and 3-4 display dynamic graphs that display data collected by the U.S. Geological Survey (USGS) and NEWNET respectively. USGS's graph is generated through CGI, while NEWNET's is generated through ASP.

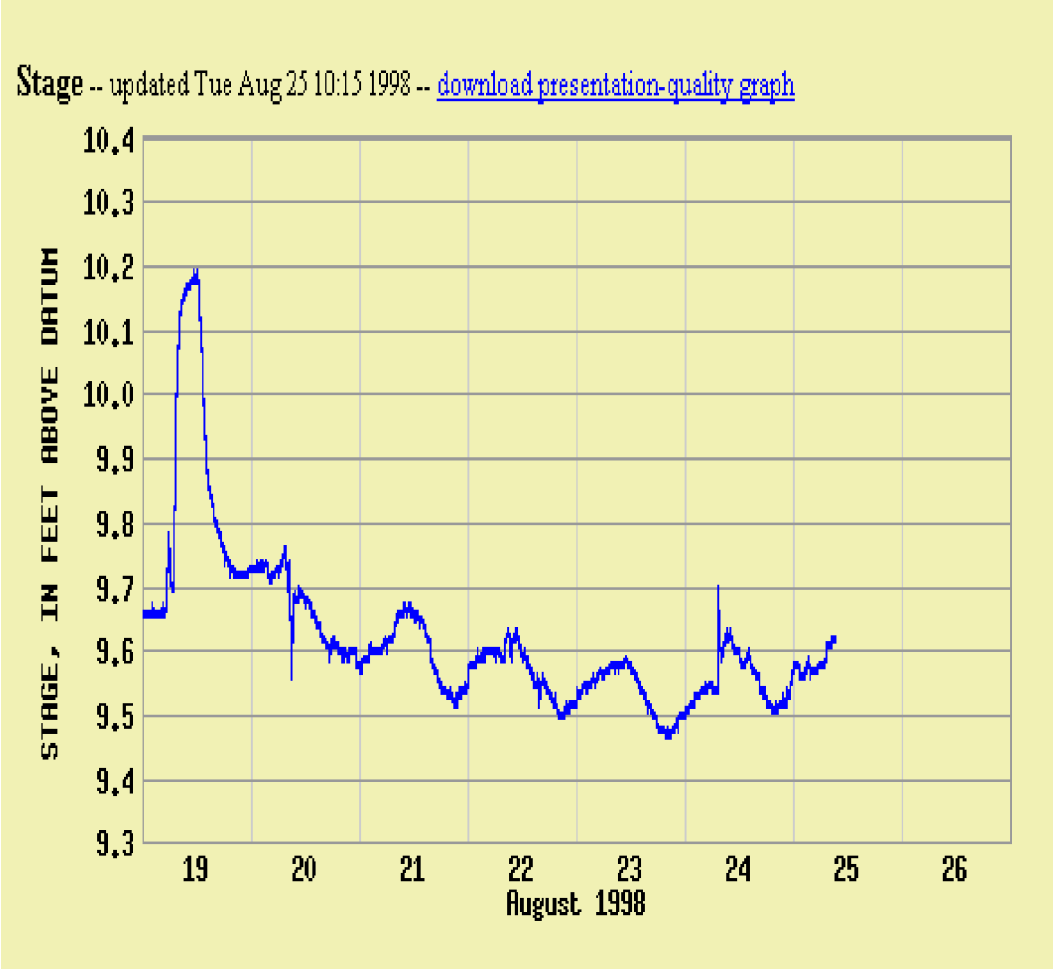


FIGURE 3-3: USGS Graph Of Stream Stage Date Collected in Santa Anna, CA
http://wwwdcascr.wr.usgs.gov/rt-cgi/gen_stn_pg?station=11051502

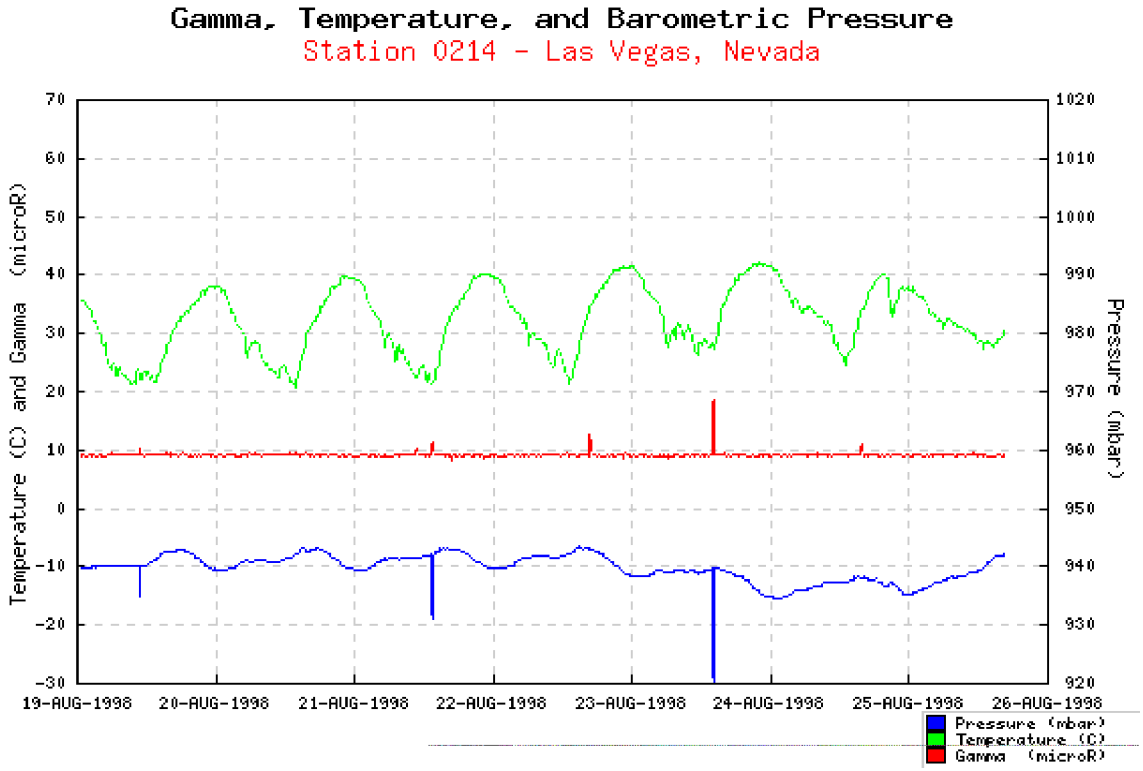


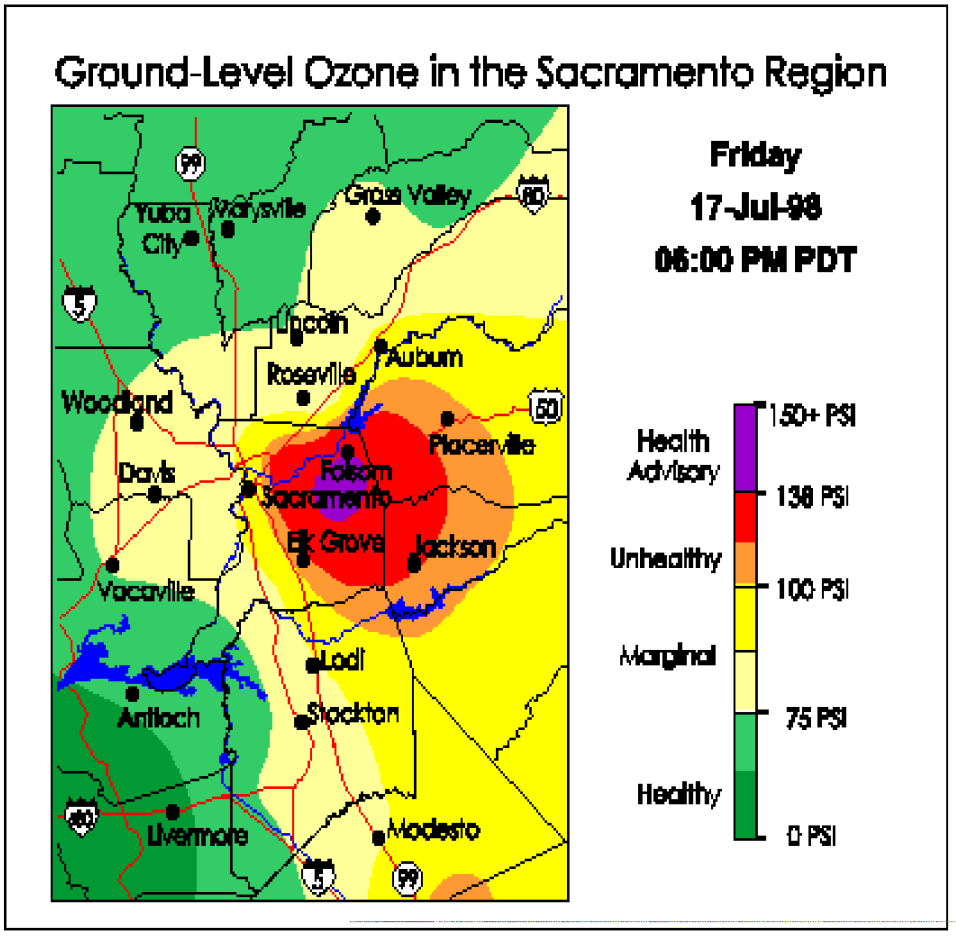
FIGURE 3-4 Gamma, Temperature, and Barometric Pressure Chart from NEWNET Monitoring Station in Las Vegas, NV
http://newnet.jdola.lanl.gov/gamma_graph.asp?span=7&number=0214

Animated GIFs

"GIF" stands for Graphics Interchange Format. It is one of the most widely used graphic formats on the World Wide Web. An animated GIF is a single file containing a set of images presented in sequential order. It depicts motion much like cartoon animations in a seamless frame-by-frame fashion. Special GIF assembly software is needed to create the animated GIFs.

The Web sites for AIR*NOW* and Sonoma Technologies provide examples of animated GIFs that are being used by EMPACT projects. Both Web sites provide animated GIFs that show changes in ozone concentrations over 20 minute intervals for the eastern United States (Figure 3-2) and the greater Sacramento region (Figure 3-5).

FIGURE 3-5: Ozone Mapping Animation Example on SMAQMD's Web site *http://www.sparetheair.com*



Java (programming language), Shockwave (Web browser plug-in), and other tools can be also used to build applets or mini programs that achieve the same effects as an animated GIF. The Automated Weather Source page (Figure 3-6) uses Java programming to show changes in wind speed, wind direction, and temperature in real time.

FIGURE 3-6: Example of Java Animation on the Automated Weather Source
http://www.aws.com/index2.html

3.2 Other Ways of Delivering Data and Information

EMPACT projects are encouraged to devise new and innovative approaches to providing information to the public. The Web is likely to be a primary tool in delivering EMPACT data, but it is only one of several ways to disseminate information. Many individuals, especially in disadvantaged communities where EMPACT data may be needed the most, do not have access to the World Wide Web. To reach the broadest possible audience, EMPACT projects must use other forms of communication in addition to the Web. It is not enough to simply establish a Web page and hope the public finds it. The Web should be viewed as one of several tools that projects can use to reach their intended audiences.

Television, Radio, and Newspapers

Television, radio, and newspapers offer unique communications capabilities, and all EMPACT projects should engage the mass media to some degree. In particular, the mass media are able to reach a much larger audience than a Web site is likely to. Moreover, television, radio, and newspapers will often welcome the opportunity to participate in EMPACT projects. These media should be viewed as tools for both disseminating environmental information and building awareness of a project. For example, EMPACT could provide data for public service announcements or for use on news broadcasts and weather reports. It is also important to publicize EMPACT projects. The best Web site is of little use of no one knows of its existence. Mass media are especially well suited to informing the public about the existence of a project From another perspective, EMPACT projects may be considered to be news stories in their own right, and project managers should consider issuing press releases that describe their activities. Finally, in limited circumstances, it may be appropriate to place advertisements in local newspapers or radio stations that introduce a project to the public.

There are several special considerations in working with mass media. First, television, radio, and to a lesser extent, newspapers, are not well suited to providing complex information. In particular television and radio provide information for only a few seconds. Web pages are capable of providing much more information and of placing it in context. Second, mass media are one-way; they do not allow users to tailor information to their own preferences or to provide feedback to a project. Third, partnering with local media can be resource intensive, though it does not have to be. Fourth, mass media are not able to provide real-time data as readily as a Web site. Despite these potential drawbacks, most EMPACT projects should plan to work with local media to some degree, either as a means of providing data to the public or informing the public about the existence of the project.

New Uses of Existing Technologies

Existing technologies can be used in new ways to provide EMPACT information. For example, Sacramento residents are alerted by e-mail about hazardous ozone concentrations in the

atmosphere. NEWNET uses environmental teller machines similar to bank automated teller machines equipped with interactive computer screen displays that provide information about radiation. Telephone hotlines are also being used to provide (e.g., Charles River and Boston Harbor Water Quality Monitoring Project) and air quality (e.g., Sacramento's Ozone Mapping Project). Telephone technology also permits more interactive exchange of information with users (e.g. "Press 1 for the menu of air quality measures.."). MIT has developed a technology that uses speech recognition software to allow users to call a telephone number and obtain updated weather information from over 500 locations (*http://www.sls.lcs.mit.edu/sls/whatwedo/applications/jupiter.html)*. Other potential technologies that could be used to convey EMPACT information might include billboards with electronic displays and information signs now used to alert drivers to changing traffic conditions.

Publications, Community Meetings, Archives

Written publications (e.g., newsletters, brochures, fact sheets), community meetings and archives tend to serve a different purpose from the World Wide Web. The Web is well suited for providing environmental information interactively in real time. Publications cannot provide environmental information in real time, but they can raise awareness of EMPACT among individuals who do not have access to the Web. Community meetings, like those conducted by the Dorchester Lead Yard Safe program, promote community involvement and ownership of the program, while raising awareness in the community about local environmental conditions. Finally, environmental data can be archived in public libraries where it can be used for research or help preserve an often neglected aspect of local history.